ASDO Scheduling Trade Studies

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Objective

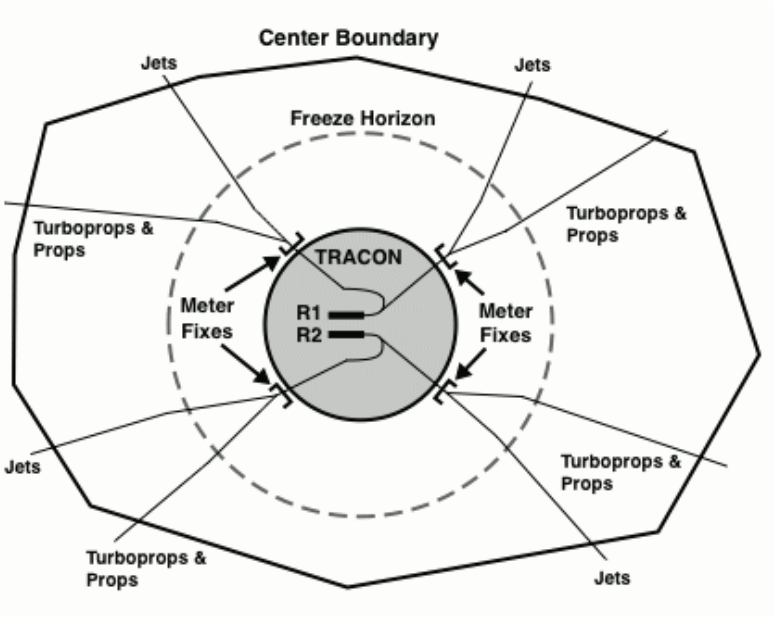
Evaluate trade offs between various controls of the ASDO scheduler.

- How should the control elements in the terminal area be used to best mitigate the uncertainty in the ASDO scheduling domain?
- How should the scheduler be adjusted to accommodate the variety of advanced technologies and procedures?

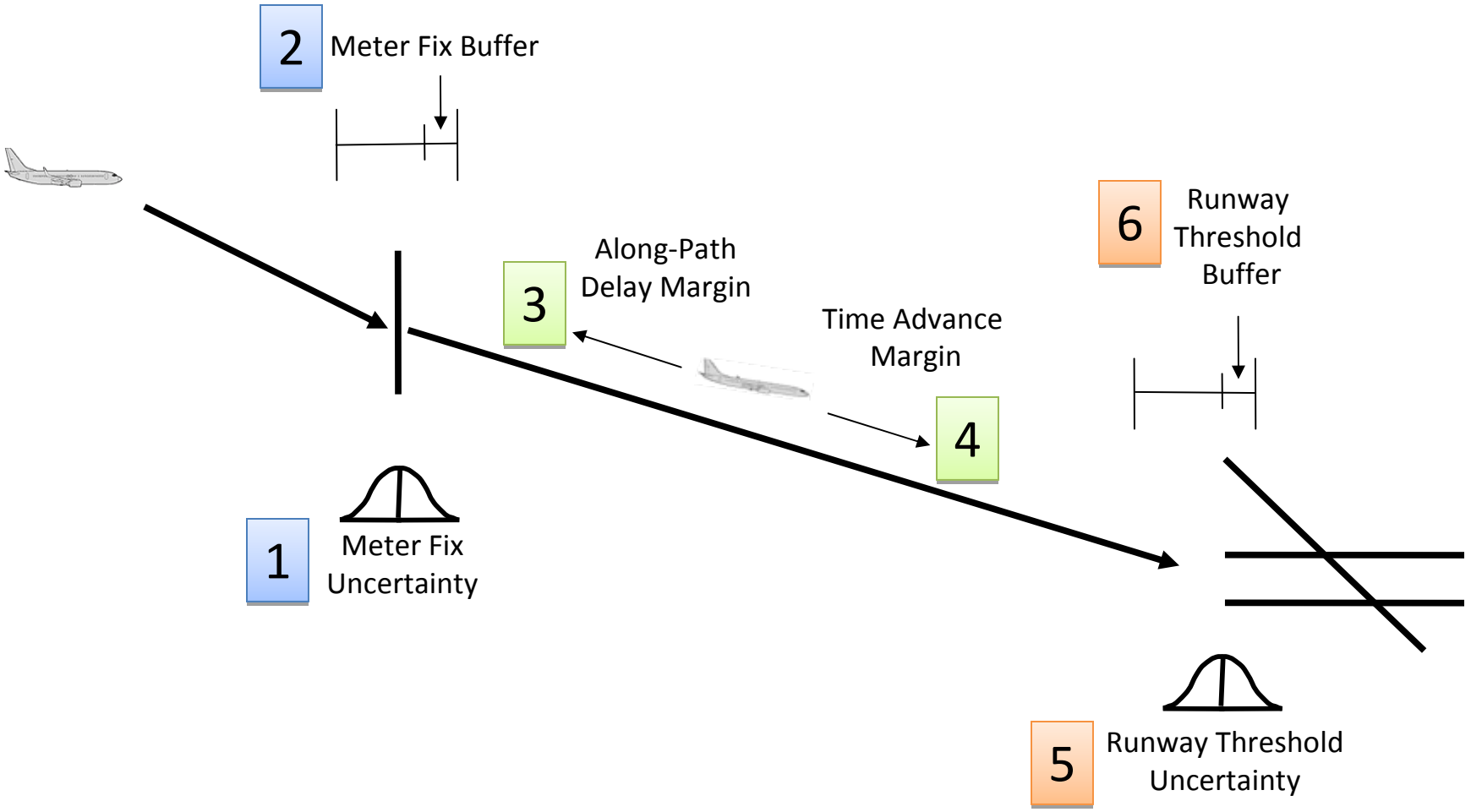
Results will be the basis for ASDO scheduler used in FY10 HITL simulation

STASS

- Stochastic Terminal Area Scheduling Simulation
- Developed by Larry Meyn and Heinz Erzberger
- Monte Carlo Simulation of two-point scheduling



Simulation Parameters



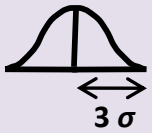
Simulation Parameters

Stochastic element	Control mechanism			
Delivery Accuracy @ Meter Fix	Buffer @ Meter Fix	Buffer @ Runway	Delay Margin in Terminal Area	Time Advance in Terminal Area
Delivery Accuracy @ Runway				

Various concepts can be modeled:

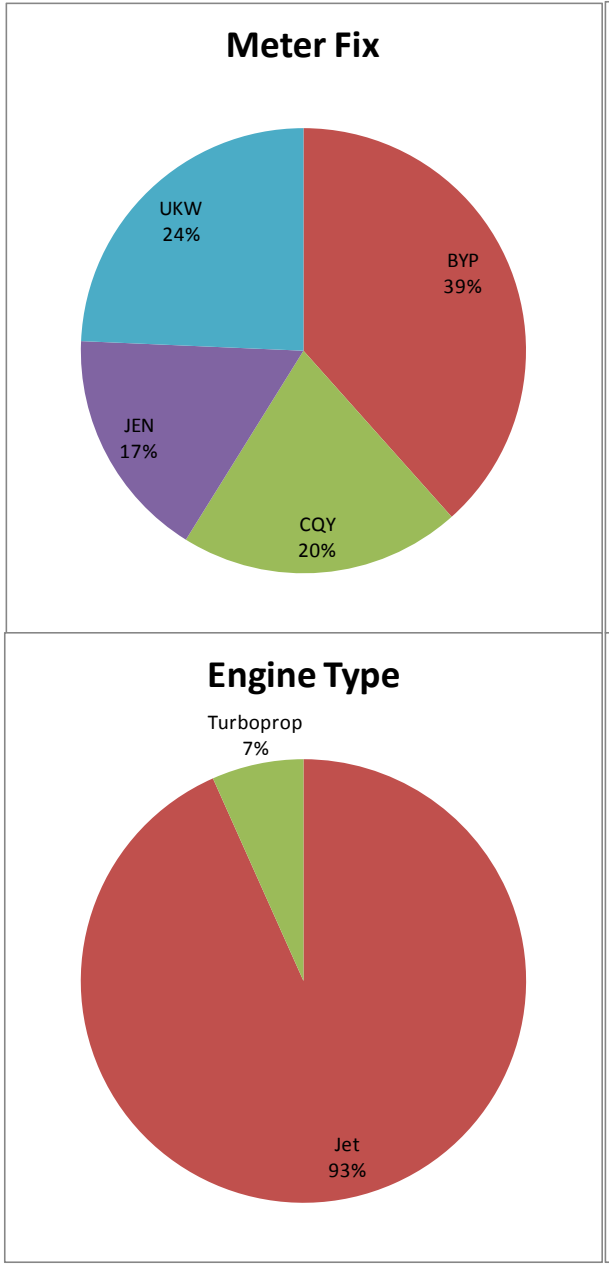
- Continuous descent approaches (CDAs)
- Flight deck merging and spacing (FDMS)
- Required Navigational Performance (RNP) operations
- Very Closely Spaced Parallel Runway (VCSPR) operations

Simulation Parameters

Precision Level	I	II	III	IV	V
Stochastic Element 					
Arrival Time @Meter Fix	±200 sec	±150	±100	±50	0
Interarrival Time @Threshold	±30 sec	±22.5	±15	±7.5	0
Arrival Time @Threshold	±21.2 sec	±15.9	±10.6	±5.3	0
Control Element					
Extra Sep. Buffer @Meter Fix	48 sec	36	24	12	0
Extra Sep. Buffer @Threshold	30 sec	22.5	15	7.5	0
Delay margin	180 sec	120	60	30	0
Time advance margin	60 sec	45	30	15	0

Dataset

- Derived from recorded Dallas/Fort Worth (DFW) traffic
- Uses up-to-date DFW South Flow airport configuration
- Includes approximately 200 arrivals



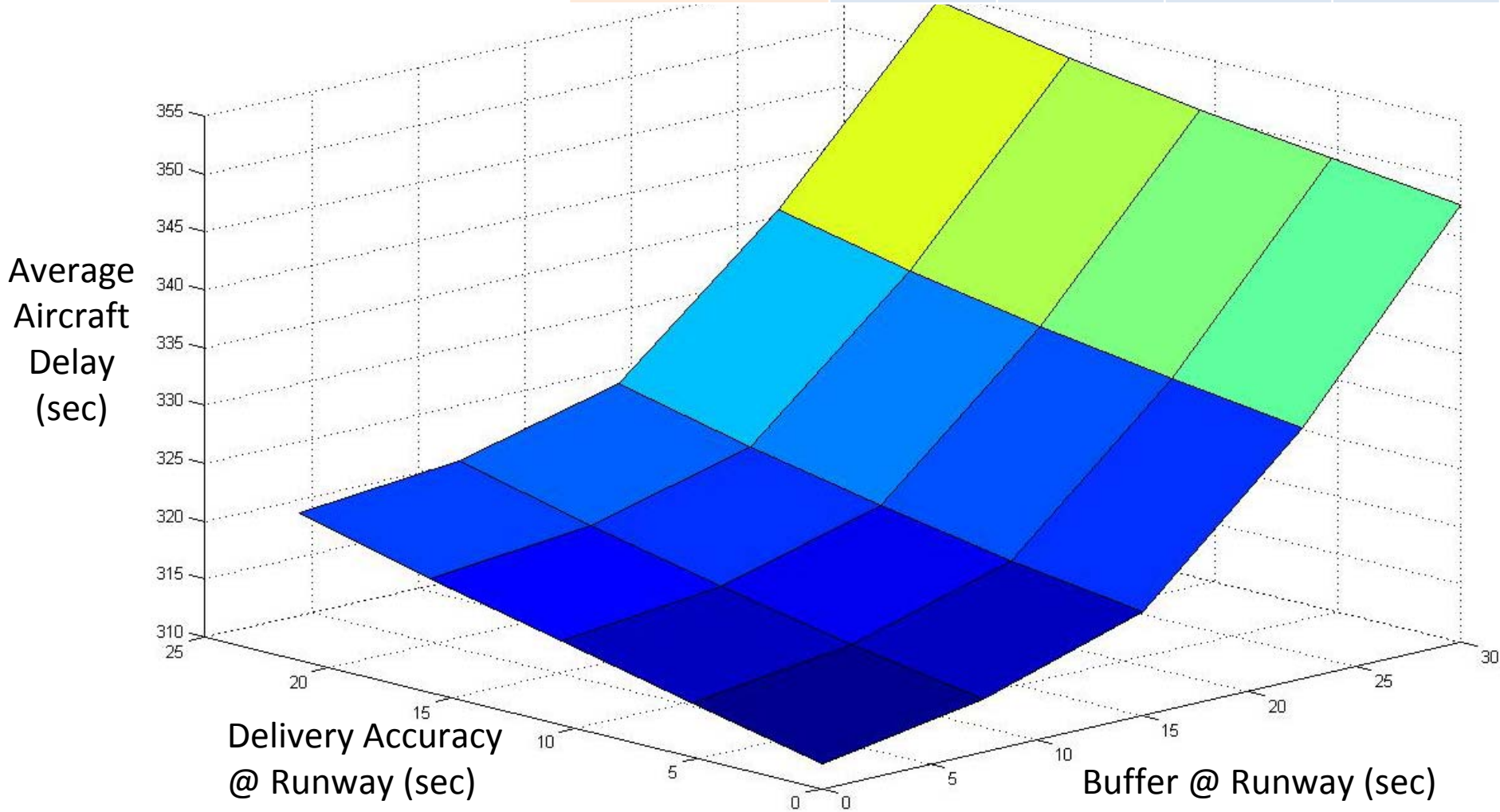
Metrics

Airport throughput	Separation violations
Peak	Meter fix
Average	Runway
Controllability	**Delay**
Time to loss of controllability	Average
No. aircraft exceeding delay margin	Max
Average delay margin overage	Min
	Center
	TRACON

Results

Demand 2x

Stochastic element	Control mechanism			
Delivery Accuracy @ Meter Fix **50 seconds**	Buffer @ Meter Fix **12 seconds**	Buffer @ Runway ***Varied***	Delay Margin in Terminal Area **60 seconds**	Time Advance in Terminal Area **0 seconds**
Delivery Accuracy @ Runway ***Varied***				



Results

Demand 2x

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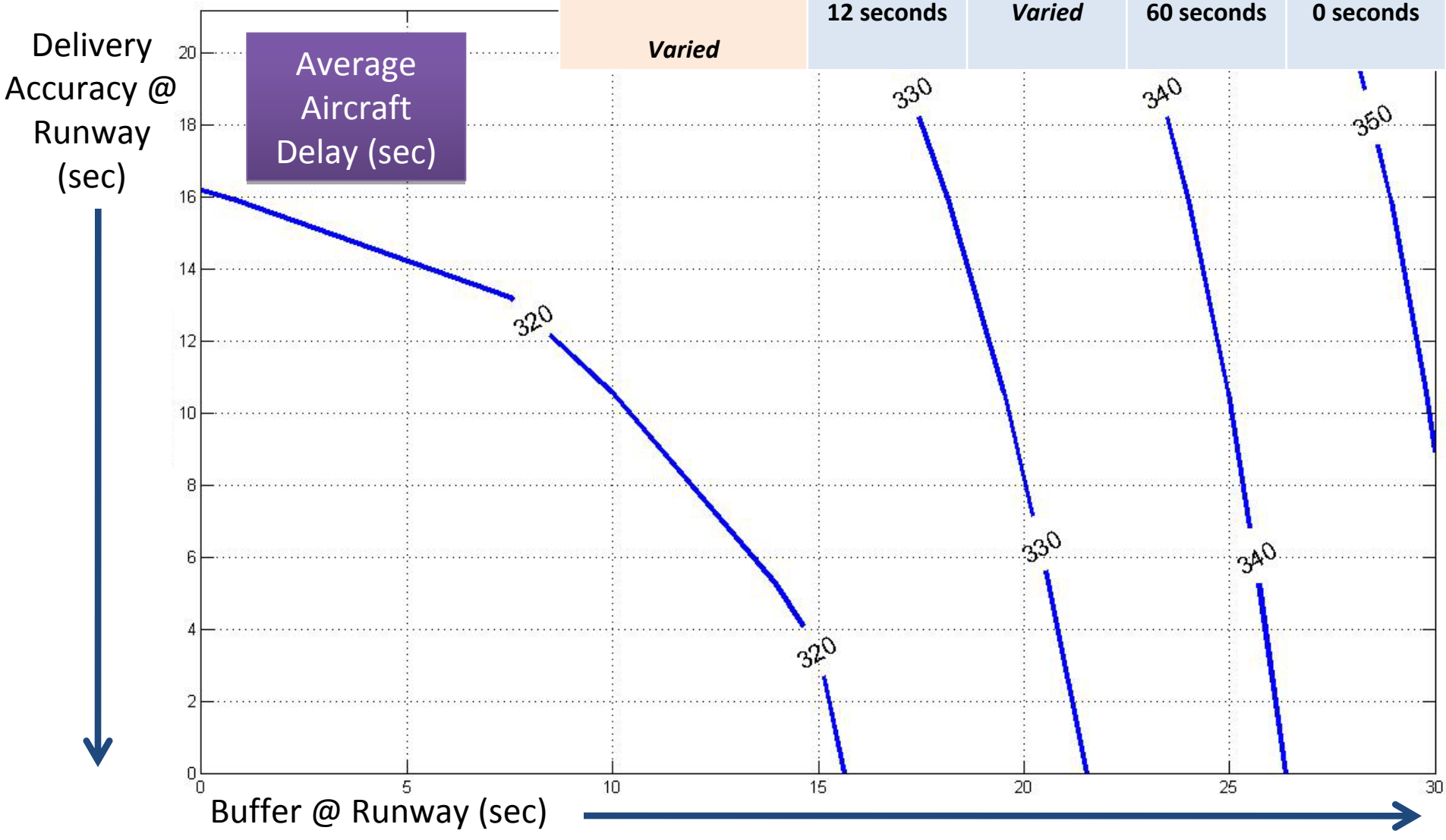
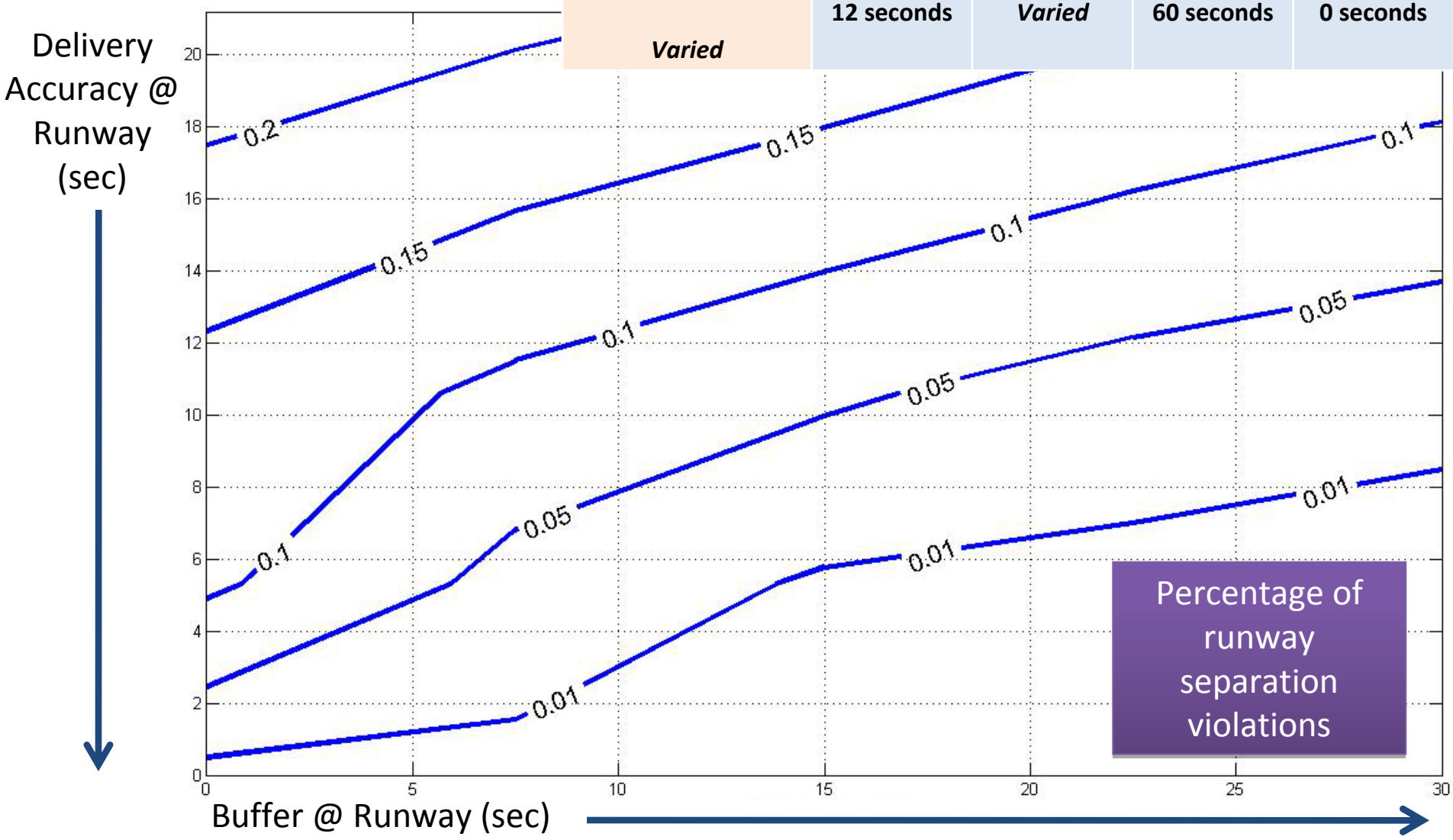
Delivery Accuracy @ Runway ***Varied***				



Results

Demand 2x

Stochastic element	Control mechanism			
Delivery Accuracy @ Meter Fix **50 seconds**	Buffer @ Meter Fix	Buffer @ Runway	Delay Margin in Terminal Area	Time Advance in Terminal Area
Delivery Accuracy @ Runway ***Varied***	**12 seconds**	***Varied***	**60 seconds**	**0 seconds**



Summary

- Investigate trade-offs of various operating points with respect to system performance
- Fast-time simulation models meter fix and runway uncertainty and control parameters
- Dimensionality of parameters has made generalization of results difficult